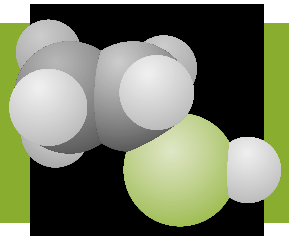


Nylon 6 Recycling

Benefits

- Reduced energy consumption
- Reduced raw material and disposal costs
- Creation of new jobs in the recycling industry
- Reduced landfilling of nylon waste carpets and other nylon 6 materials

New Process to Recover and Reuse Nylon Waste

Consumer demand for recycled products is on the rise. As landfill costs and environmental regulations also increase, technologies to recover and reuse valuable raw materials have never been more attractive to manufacturers. Using such technologies, manufacturers can reduce disposal and raw material costs while satisfying customer demand.

The nylon carpet industry is no exception to this trend. Carpet manufacturers are facing increasing pressure to provide products made from recycled materials. A new technology developed by Honeywell/Allied Signal and DSM Chemicals can now help recycle the approximate 1.8 million tons of nylon carpet sent to landfills each year. The technology allows nylon manufacturers to recover and reuse caprolactam, the raw material used to make nylon 6. As joint venture partners of Evergreen Nylon Recycling, Honeywell/Allied Signal and DSM now manage the largest commercial-scale nylon recycling plant in the world.

Evergreen Nylon Recycling Facility

The nylon 6 recycling process developed by Honeywell/Allied Signal and DSM Chemicals has resulted in Evergreen Nylon Recycling, a joint venture to recover and reuse caprolactam.

Solution

Honeywell/Allied Signal and DSM Chemicals have developed an innovative nylon renewal process to recover and reuse caprolactam, the monomer building block of all nylon 6 products. The first facility of its kind, the Evergreen Nylon Recycling plant uses this new process in a true closed-loop depolymerization and purification system that allows whole carpets to be fed into the facility. Expensive mechanical separation/ beneficiation is eliminated, and the nylon carpet is converted back to virgin quality caprolactam. The process is a model of energy efficiency, saving 700,000 barrels of oil and 4.4 trillion Btus annually in comparison to conventional caprolactam production. Although Evergreen is recycling only nylon 6 carpets and post-industrial fiber waste, the technology can be applied to any nylon 6 product, including fibers for commercial and residential carpets, engineering plastics, automotive parts, sporting goods, and films for packaging.

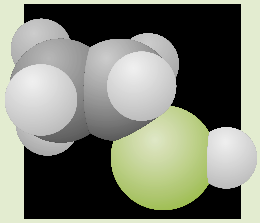
Results

The U.S. Department of Energy's Office of Industrial Technologies (OIT) provided funding during the experimental phases of technology development. Honeywell/Allied Signal and DSM Chemicals are using the resulting technology in their new Evergreen Nylon Recycling facility in Augusta, Georgia. This $100-million nylon 6 recycling plant will keep more than 200 million pounds of post-consumer carpet waste out of U.S. landfills each year. DSM expects to open a second plant in Europe.

Evergreen will produce approximately 100 million pounds of new caprolactam per year. Honeywell/Allied Signal is using the Evergreen caprolactam to produce its Infinity™ Forever Renewable Nylon for all nylon applications. Mohawk Commercial Carpet is already using Infinity™ to manufacture ten different styles of carpet. Ford is also planning to use Infinity™ in several applications, including a throttle body adapter and an air intake manifold. In the future, Honeywell/Allied Signal expects automakers to use Infinity™ for products such as door handles, hood components, and air bags.

DSM will market its share of the recycled caprolactam under the trade name ReCap™, which will be available to the entire merchant caprolactam market. ReCap™ will also be used in DSM's downstream nylon polymer products, including carpet spinning chips and DSM Akulon Renew brand engineering plastic resins.

The technology has won several prestigious awards, including the 1999 Design for Humanity Award for the full-scale commercialization of Infinity™ Forever Renewable Nylon. Evergreen was named "Recycler of the Year" by the Plastic Recycling Division of the Society of Plastics Engineers. This year, the U.S. Department of Energy plans to showcase the Evergreen facility as a model for energy savings, and the technology is a finalist for OIT's 2001 Technology of the Year (winner to be announced at EXPO).



Project Partners:

DSM Chemicals
Honeywell (formerly Allied Signal)

For Additional information, contact:

Charles Russomanno
Office of Industrial Technologies
Phone: (202) 586-7543
Fax: (202) 586-1658
E-mail: charles.russomanno@ee.doe.gov

Please send any comments, questions, or suggestions to webmaster.oit@ee.doe.gov

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Office of Industrial Technologies
Energy Efficiency
and Renewable Energy
U.S. Department of Energy
Washington, DC 20585

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